



National Digital Mammography Archive ^c

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Summary

The National Digital Mammography Archive (NDMA) represents a collaborative effort between

- University of Pennsylvania [Medical Center](#) (including the [National Scalable Cluster Project](#))
- University of Chicago [Department of Radiology](#)
- University of North Carolina - Chapel Hill School of Medicine [Department of Radiology - Breast Imaging](#)
- [Sunnybrook and Women's College Health Sciences Centre of the University of Toronto](#), and
- [Advanced Computing Technologies Division](#) of BWXT Y-12 L.L.C. in Oak Ridge, Tennessee

to develop a testbed that demonstrates to the National Library of Medicine the feasibility of a national breast imaging archive and network infrastructure to support digital mammography using Next Generation Internet (NGI) technologies.

The proposed National Digital Mammography Archive (NDMA) will

1. Support traditional breast screening through the maintenance and distribution of a digital record of prior breast examination and relevant medical history for primary interpretation and expert consultation;
2. Provide the opportunity to maintain and apply computer-aided diagnosis software at central, well-maintained computing resources to studies from all women;
3. Provide unique tools for creating educational and training programs; and
4. Create an unparalleled opportunity to study and understand many epidemiologic issues in breast cancer through searches of a national breast screening database.
5. Ensure privacy and confidentiality of patient information and implement multi-layered security throughout the system.

NGI technologies are required to schedule transfer of large data files, execute queries, and access information securely. Our testbed is demonstrating that Quality of Service, medical data privacy and security, nomadic computing, network management, research and development, and infrastructure technology as a means for collaboration are NGI technologies that are integral to widespread deployment and optimal utilization of digital mammography.

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Rationale for Next Generation Internet

Breast Imaging Modalities

Digitized Mammography (film): 4 views (2 CC, 2 MLO); ~ 100 - 160 Mb per study (Image from USF Digital Mammography Data Base)

Digital Mammography (FFDM): 4 views per study @ 40 Mb each = 160 Mb per study (Image enhanced by Martin Yaffe, Ph.D., University of Toronto)

MRI: 512 x 512 x 32 x 12 bits; 5 sets per image; ~ 100 - 150 Mb/study (Image provided by Mitchell Schnall, M.D., Ph.D., Department of Radiology, University of Pennsylvania)

1. Images are very large, ranging from 120 - 200 Megabytes per study.
2. Volume of data per breast center site will exceed capacity for management storage
 - There are 58 million women needing mammograms in the U.S. With targeted 60% compliance, there would be 35 million exams per year (screening exams).
 - At 160 Megabytes per exam, the annual volume could exceed 5.6 petabytes/year, and the minimal daily traffic/day is expected to be 2 terabytes.
3. The scheduling of traffic for archiving current exams and pre-fetching prior studies requires quality of service not available on conventional networks.
4. Accommodating unscheduled exams and instant access to expert consultation requires network bandwidth not available on standard Internet.
5. All transmissions of images and information containing individually identifiable patient data must be encrypted across public networks.

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Project Phases

- Phase I - Planning Phase (completed), 10/98 - 6/99
- Phase II - Limited Testbed Development and Implementation (in Progress) - 11/02
- Phase III - Expanded Operational Testbed and Program Evaluation (planned program; successful Phase II projects would be funded in FY 2003 to demonstrate scalability and long-term value)

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Phase II Objectives

- Develop a fully integrated testbed that demonstrates the feasibility of a national breast imaging archive and network infrastructure to support digital mammography using Next Generation Internet (NGI) technologies.
 - Provide the infrastructure to permit access to prior mammography and appropriate records to assist in interpreting current exams no matter where the prior exams were performed.
 - Provide a mechanism for instant consultation with experts in order to obtain second opinions. Incorporate computer aids for reading mammograms into archive and make available over network to local sites.
 - Develop innovative teaching tools to improve the consistency and high quality interpretation of mammography, and
 - Ensure privacy and confidentiality of patient information.

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NDMA Multimedia Overview

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UNITED STATES

National Library of Medicine
